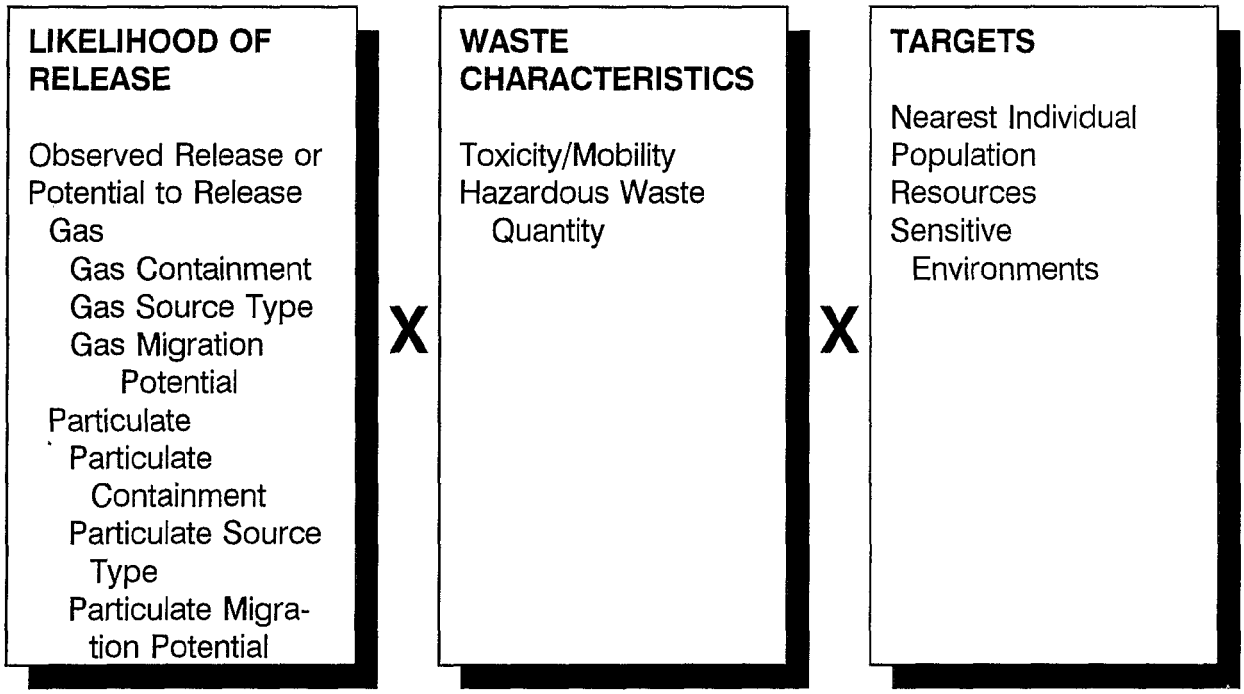
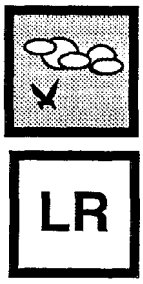
CHAPTER 10
AIR PATHWAY



SECTION 10.1
OBSERVED RELEASE



This section provides guidance on demonstrating and documenting observed releases in the air pathway and discusses observed releases established both by direct observation and by chemical analysis. See Chapter 5 for general guidance on scoring observed releases. The emphasis in this section is on HRS scoring rather than field activities; only limited information is provided on monitoring, sampling, handling, and analysis procedures. For the air pathway, documentation of observed releases by direct observation does not involve the use of atmospheric sampling but is established through visual observation of a release or through inferential observations (see discussion below). Observed releases by chemical analysis require atmospheric sampling and laboratory analysis to establish the presence of the chemical. EPA's *Guidance for Conducting Site Inspections Under CERCLA* (OSWER Publication 9345.1-05) provides information on sampling strategies for the air pathway.

RELEVANT HRS SECTIONS

Section 2.3	Likelihood of release
Section 6.1	Likelihood of release
Section 6.1.1	Observed release

DEFINITIONS

Attribution: The determination that a hazardous substance in a release is likely to have originated in one of the sources at a site. Attribution usually requires documenting that at least one hazardous substance found in a release at a concentration significantly above background (or directly observed in the release) was produced, stored, deposited, handled, or treated at the site; and at least a portion of the significant increase could have come from a source at the site.

Background Level: The concentration of a hazardous substance that provides a defensible reference point that can be used to evaluate whether or not a release from the site has occurred. The background level should reflect the concentration of the hazardous substance in the medium of concern for the environmental setting on or near a site. Background level does not necessarily represent pre-release conditions, nor conditions in the absence of influence from source(s) at the site. A background level may or may not be less than the DL, but if it is greater than the DL, it should account for variability in local concentrations. A background level need not be established by chemical analysis.

Background Sample: A sample used in establishing a background level.

Contract Laboratory Program (CLP): The analytical program developed for CERCLA waste site samples to fulfill the need for legally defensible analytical results supported by a high level of quality assurance and documentation.

Contract-required Detection Limit (CRDL): A term equivalent to the CRQL, but used primarily for inorganic substances.

Contract-required Quantitation Limit (CRQL): The substance-specific level that a CLP laboratory must be able to routinely and reliably detect in specific sample matrices. The CRQL is not the lowest detectable level achievable, but rather the level that a CLP laboratory must reliably quantify. The CRQL may or may not be equal to the quantitation limit of a given substance in a given sample. For HRS purposes, the term CRQL also refers to the CRDL.

Detection Limit (DL): The smallest quantity of a hazardous substance that can be distinguished from the normal random "noise" of an analytical instrument or method. For HRS purposes, DL is the MDL or, for real-time field instruments, the IDL as used in the field.

Method Detection Limit (MDL): The lowest concentration of a hazardous substance that a method can detect reliably in either a sample or blank.

Observed Release: An observed release is established for the ground water, surface water, or air migration pathway either by chemical analysis or by direct observation. Observed release is not relevant to the HRS soil exposure pathway. The minimum requirements for establishing an observed release by chemical analysis are analytical data demonstrating the presence of a hazardous substance in the medium significantly above background level, and information that some portion of that increase is attributable to the site. The minimum criterion for establishing an observed release by direct observation is evidence that the hazardous substance was placed into or has been seen entering the medium.

Release Sample: A sample taken to determine whether the concentration of a hazardous substance is significantly above its background level in order to determine whether an observed release (or observed contamination) has occurred.

Sample Quantitation Limit (SQL): The quantity of a substance that can be reasonably quantified given the limits of detection for the methods of analysis and sample characteristics that may affect quantitation (e.g., dilution, concentration).

Similar Samples: Samples from the same environmental medium that are identical or similar in every way (e.g., field collection procedure, analytical technique) except the degree to which they are affected by a site.

ESTABLISHING AN OBSERVED RELEASE BY DIRECT OBSERVATION

An observed release by direct observation can be established in the air pathway by one of two methods:

- A material containing one or more hazardous substances is seen entering the atmosphere directly. Visually observing dust blow off a pile into the atmosphere during an SI is an example of an observed release by direct observation. However, sampling from the dust's point of origin (e.g., the area on the pile from which the dust is released) should indicate that the dust contains hazardous substances. Although not required, photographs are helpful in documenting an observed release by direct observation.

- If evidence supports an inference of a release to the atmosphere, a demonstrated adverse effect may be used to establish an observed release. This approach for establishing an observed release by direct observation will be useful when visual evidence is not available. Visual evidence is preferable for establishing an observed release, but may not be practical in cases where the hazardous substance is an invisible gas or in cases where the release of the hazardous substance can only be

documented historically. For example, if available evidence demonstrates that two substances, which may react to form a poisonous gas, are present in an open surface impoundment, an adverse effect that would satisfy the criteria for an observed release would be an individual at the site overcome by fumes from the impoundment. Even if the fumes were invisible (and thus could not be "seen"), an observed release by direct observation could be established based on demonstrated adverse effects (e.g., a hospital report stating that a person was overcome by fumes containing a hazardous substance). The emphasis of this example is the ability to support the inference of a release (i.e., that the two reactive chemicals are present) and the occurrence of the demonstrated adverse effect. There are other cases in which a scorer may infer that a release to the atmosphere probably has occurred but cannot score an observed release. For example, if a row of trees near the site is dead, it would usually not be possible to determine if the trees died from a hazardous substance in the atmosphere that was released from the site or from another, unrelated cause.

ESTABLISHING AN OBSERVED RELEASE BY CHEMICAL ANALYSIS

An observed release by chemical analysis in the air pathway is established based on analytical data that indicate that hazardous substances have been detected in the air. Perform the following steps for each detected hazardous substance.

(1) **Determine whether a detected hazardous substance can be attributed to sources at the site.** Sampling results or records (e.g., manifests) indicating the presence of the hazardous substance in a source at the site are the strongest documentation. Information that the hazardous substance was used at the facility is also acceptable.

(2) **Determine the background level for the hazardous substance.** Determining the appropriate background level requires analytical results from an appropriate background sampling location (e.g., upwind from the site, outside a smoke plume) for substances that could be naturally occurring, ubiquitous, or attributable to other sources in the area. A background level of 0 can be assumed for hazardous substances that are not naturally occurring, not ubiquitous, and not attributable to other sources in the area (i.e., a background sample may not be needed).

(3) **Determine the appropriate quantitation limit for the hazardous substance.** If available, the SQL should be used. If the SQL cannot be established and the sample analysis was performed under the EPA CLP, use the EPA CRQL in place of the SQL. If the SQL cannot be established and the sample analysis was not performed under the EPA CLP, use the DL (as defined in HRS section 1.1) in place of the SQL.

(4) **Compare the hazardous substance concentration at the sampling location (e.g., downwind from the site, crosswind from the site) to the appropriate quantitation limit.** If the concentration of the hazardous substance at an appropriate sampling location is less than the quantitation limit, an observed release is not established at the sampling location. If other hazardous substances were detected at the sampling location, start again with Step (1). If the concentration is greater than or equal to the quantitation limit, continue to the next step.

(5) **Compare the hazardous substance concentration at the downwind or crosswind sampling location to the background level.** If the background concentration is not detected or is less than the DL (includes cases where the background level is 0), an observed release is established if the sample measurement equals or exceeds the quantitation limit and at least some portion of this significant increase is attributable to the site. If the background concentration is greater than or equal to the DL, the minimum requirements for establishing an observed release are:

- The sample concentration should be greater than or equal to three times the background concentration; and

- At least some portion of this significant increase should be attributable to the site.

See Section 5.1 for a discussion of significance above background.

The ability to obtain reliable sampling data (i.e., from background and test samples) that document an observed release is limited by the highly variable nature of the atmosphere and its effects on emissions from a site. In recognition of the difficulties of atmospheric sampling, EPA has published several relevant guidance documents. ***Highlight 10-1*** presents guidance of particular interest.

In reviewing sampling data for the air migration pathway, the scorer should determine whether background samples and samples with significant concentration increases attributable to the site (e.g., downwind samples) can be considered similar. Meteorological monitoring (e.g., temperature, relative humidity, precipitation, and especially wind speed and direction) should be conducted at the same time and location as sampling so that non-site-related factors possibly influencing the samples can be identified. The most important of these meteorological measurements are wind speed and direction, which are crucial to an accurate sampling regimen. In addition, the scorer should determine if all of the following are true for background samples and samples with significant concentration increases attributable to the site:

- Samples are taken at nearly the same time or during the same approximate time period;

- Samples are taken at approximately the same elevation relative to the suspected sources at the site; and

- Samples are collected and analyzed using equivalent methodologies.

HIGHLIGHT 10-1
SELECTED EPA GUIDANCE ON AIR SAMPLING

The documents listed below do not discuss the particular requirements ofthe HRS, but rather provide general information on atmospheric monitoring, sampling, and analysis. Theseare suggested sources of information; other documents also may provide appropriate guidance.

- *Air/Superfund National Technical Guidance Study Series. Volume II - Estimation of Baseline Air Emissions at Superfund Sites* (EPA-450/1-89-002a, August 1990).

- *Air/Superfund National Technical Guidance Study Series. Volume IV - Procedures for Dispersion Modeling and Air Monitoring for Superfund Air Pathway Analysis (Interim Final)* (EPA-450/1-89-004, July 1989).

- *Compendium of Methods for the Determination of Toxic Organic Compounds in Ambient Air* (EPA600/4-89-017, June 1988).

- *Guidance on Applying the Data Quality Objectives Process for Ambient Air Monitoring Around Superfund Sites* (Stage Ill) (EPA-450/4-90-005, March 1990).

- *Technical Assistance Document for Sampling and Analysis of Toxic Organic Compounds in Ambient Air* (EPA-600/4-83-027, June 1983).

TIPS AND REMINDERS

- Any accepted monitoring, sampling, and analysis methods that are equivalent to EPA standards may be used to establish an observed release. EPA has produced a number of guidance documents that may assist scorers in the selection of appropriate monitoring, sampling, and analysis methods (see ***Highlight 10-1*** for a discussion of suggested guidance documents), but other methods may be appropriate.

- Sampling is not restricted to the "breathing zone;" however, sampling elevation for background and contaminated samples should be similar. Often site-specific meteorological and topographical considerations will determine the appropriate sampling elevation.

- Stationary ambient air monitors may be used to establish an observed release provided that the methods used in monitoring, sampling, and analysis are equivalent to EPA standards.

- Data collected with real-time instruments (e.g., Organic Vapor Analyzers (OVA)), which provide instantaneous results, may be used to identify locations for more accurate sampling, but in most cases should not be used to establish an observed release by chemical analysis.

- Indoor air samples cannot be used to establish an observed release by chemical analysis.

- Stack analyses from operating facilities generally should not be used to establish an observed release.

- In some cases, wipe samples may be used to document historical releases to air, although it is often difficult to attribute contamination to the site based on this type of data alone.

- Regional background levels may be used on a case-by-case basis, when the regional background is deemed to reflect conditions at the site. Site-specific atmospheric monitoring at the time of sample collection is always preferable for establishing background concentrations.

- The presence of an active fire is not considered to be evidence that a hazardous substance has been released to the air unless appropriate sampling has been conducted that confirms the release of a hazardous substance.

SECTION 10.2
POTENTIAL TO RELEASE

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This section provides guidance on evaluating selected features of the air pathway potential to release factor. This section addresses the distinction between gaseous and particulate hazardous substances, provides guidelines for combining sources with similar characteristics, and discusses selected issues related to the gas and particulate containment factors. Flowcharts that summarize the scoring steps for potential to release are presented at the end of this section.

The potential to release factor in the air pathway is only scored if an observed release cannot be established (see Chapter 5 and Section 10. 1 for guidance on establishing an observed release). If no observed release to air can be established at the site, the potential to release factor value for the air pathway is determined by separately evaluating the gas potential to release and the particulate potential to release for each source at the site.

- The gas potential to release value for a source is calculated by multiplying the gas containment factor value for the source by the sum of its gas source type factor value and its gas migration potential factor value.

- The particulate potential to release value for a source is calculated by multiplying the particulate containment factor value for the source by the sum of its particulate source type factor value and its particulate migration potential factor value.

In evaluating gas source type and particulate source type, consider only sources that meet the minimum size requirement based on HRS Table 2-5 (i.e., those with a source hazardous waste quantity value of 0.5 or greater), unless there are no sources at the site that meet the minimum size requirement. If there are no sources at the site that meet the minimum size requirement, assign each source at the site a source type factor value from HRS Table 6-4.

The highest gas potential to release and the highest particulate potential to release values from among all sources are selected. The higher of these two potential to release values is the potential to release value for the air pathway.

RELEVANT HRS SECTIONS

Section 6.1.2	Potential to release
Section 6.1.2.1	Gas potential to release
Section 6.1.2.2	Particulate potential to release
Section 6.1.2.3	Calculation of potential to release factor value for the site

DEFINITIONS

Source: Any area where a hazardous substance has been deposited, stored, disposed, or placed, plus those soils that may have become contaminated from hazardous substance migration. In general, however, the volumes of air, ground water, surface water, and surface water sediments that may have become contaminated through migration are not considered sources.

DISTINGUISHING BETWEEN GASEOUS AND PARTICULATE HAZARDOUS SUBSTANCES

Before evaluating potential to release, determine whether each source has only gaseous, only particulate, or both gaseous and particulate hazardous substances associated with it. Evaluate the gaseous potential to release factor only for sources that have gaseous hazardous substances. Similarly, evaluate the particulate potential to release factor only for sources that have particulate hazardous substances. Many sources will have both gaseous and particulate hazardous substances and potential to release factors and should be evaluated for both.

- A hazardous substance is considered to be a gaseous hazardous substance whenever its vapor pressure (at or near 25°C) is greater than or equal to 10^{-9} torr (I torr = 1 millimeter of mercury).

- A hazardous substance is considered to be a particulate hazardous substance whenever its vapor pressure (at or near 25°C) is less than or equal to 10^{-4} torr.

Highlight 10-2 provides an illustration of the vapor pressure ranges for which hazardous substances are considered gaseous and/or particulate. Note that in the mid-portion of the range, hazardous substances are considered to be both gaseous and particulate for purposes of HRS scoring.

Vapor pressure varies with temperature, so it is very important to be certain that the value given is at or near 25°C. Data on vapor pressures at or near 25°C for many common hazardous substances can be found in SCDM. Alternatively, vapor pressure data can be found in many common chemical data references or can be calculated from available data on boiling point.***Highlight 10-3*** provides examples of vapor pressures for several selected hazardous substances. Values from information sources (e.g., chemistry reference books) other than SCDM may need to be adjusted to reflect vapor pressure at the appropriate temperature. Units besides torr are frequently used for pressure and need to be converted (e.g., 1 torr equals 1 mm Hg, I torr equals 1/760 of an atmosphere (atm)).

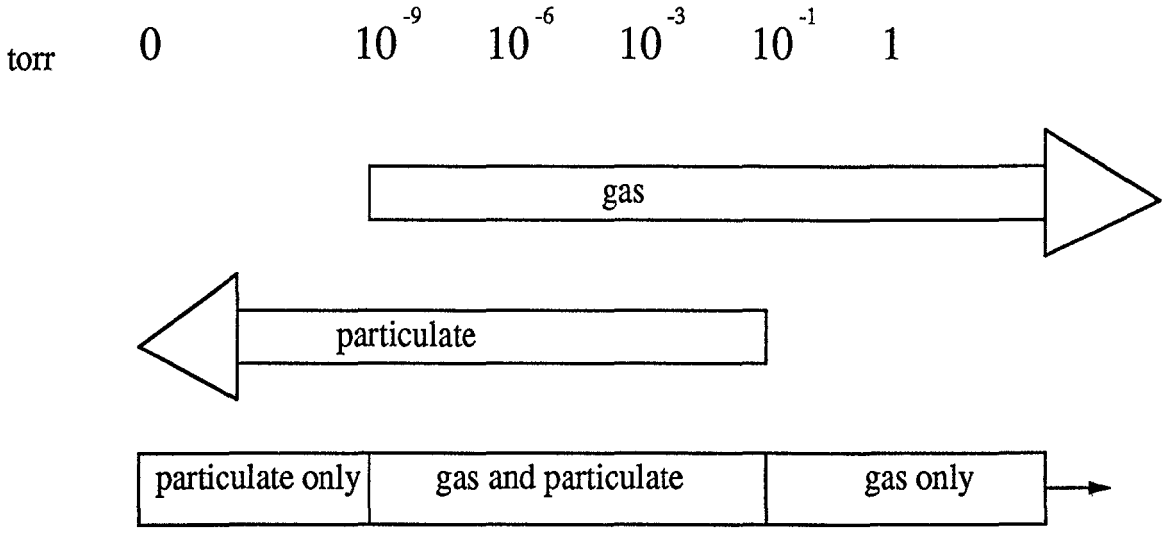
COMBINING SOURCES BEFORE CALCULATING POTENTIAL TO RELEASE

The HRS states that when evaluating either gas potential to release or particulate potential to release, the scorer can combine sources with similar characteristics Into a single source. It is most useful to evaluate two sources with similar characteristics as a combined source if the combined source exceeds the minimum size requirement, but the sources when evaluated separately do not exceed this minimum. Scorers can also combine sources to lessen the complexity of a documentation record.

For two sources to have similar characteristics in the gas (or particulate) potential to release evaluation, they should meet all of the following guidelines:

- The same gas (or particulate) containment factor value
- The same gas (or particulate) source type
- Significantly overlapping hazardous substances.

HIGHLIGHT 10-2
VAPOR PRESSURE RANGES FOR GASEOUS AND/OR PARTICULATE HAZARDOUS SUBSTANCES



NOTE: Diagram not drawn to scale.

HIGHLIGHT 10-3
VAPOR PRESSURES FOR SELECTED HAZARDOUS SUBSTANCES [a]

Hazardous Substance	Vapor Pressure (torr)	Evaluate Potential to Release for
benzene	9.5×10^{1}	gas only
chlordane	9.8×10^{-6}	gas and particulate
chromium	0	particulate only
1,2- dichlorobenzene	1.5	gas only
hexachloroethane	2.1×10^{-1}	gas only
lead	0	particulate only
methylene	4.4×10^{2}	gas only
terachloroethene	1.9×10^{1}	gas only
vinyl chloride	3.0×10^{3}	gas only

[a]Vapor pressures In this table were obtained from SCDM; they are presented for illustrative purposes only. When preparing HRS packages, the most current version of SCDM should be consulted.

To combine sources, determine the containment factor value for each of the sources separately. Hazardous substances present in either source may be used to calculate the gas (or particulate) migration potential value. A single containment factor value is assigned as the containment factor value for the combined source. Sources with gas and particulate hazardous substances should be scored separately (i.e., their scores should not be combined) regardless of other similarities between the sources.

EVALUATING GAS AND PARTICULATE CONTAINMENT

In the air pathway, containment refers to the physical characteristics of a source that impede or preclude the release of hazardous substances to the atmosphere. Containment in the air pathway is evaluated using HRS Table 6-3 for gas containment and HRS Table 6-9 for particulate containment. The evaluation is based on the presence of characteristics that match a description given in the applicable table (Section 4.1 provides assistance in characterizing sources). The descriptions in both Tables 6-3 and 6-9 have a number of limitations placed on the types of sources that will match each description. Some of these limitations are listed below:

- "Source covered with essentially impermeable, regularly inspected, maintained cover" includes only engineered containment structures (e.g., asphalt, concrete, or clay) that are in place over the entire source and by their physical structure prevent migration of hazardous substances into the atmosphere.

- "Soils that are resistant to gas migration" include only moist fine-grained (e.g., silt loams and clays) and saturated coarse-grained (e.g., sands and sandy loams) soils. For purposes of assigning gas or particulate containment factor values, consider soils with USGS classifications of ML, CL, CH (fine-grained), or GC (coarse-grained) resistant to gas migration.

- "Particulate hazardous substances totally covered by liquids" includes only hazardous substance particulates that are overlain by liquids (thereby preventing their migration). Particulates that are controlled by application of a liquid to the land surface (e.g., dust control chemicals) would not fall under this description unless the application of the liquid resulted in the particulate being totally covered.

Several common features between the two containment evaluation tables (HRS Tables 6-3 and 6-9) should be noted.

- As in the other migration pathways, the maximum containment factor value is 10, with lower values indicating a greater degree of containment; a value of 0 indicates essentially complete containment.

- If the characteristics of a source do not match any of the descriptions, then a value of 10 is assigned to the applicable containment factor. In other words, only those characteristics specifically described in Tables 6-3 and 6-9 constitute containment barriers sufficient to warrant assignment of a value other than 10.

- With the caveats noted below (i.e., biogas release, active fire), any source covered with an essentially impermeable, regularly inspected, maintained cover would be assigned a containment of 0 for both gas and particulate containment. It should be noted, however, that some containment types may be "essentially impermeable" to particulates, but permeable to gases. For this reason, this description may apply to a particulate release, but not to a gas release from the same source.

- As indicated in ***Highlight 10-4***, many of the containment descriptions most likely to be encountered are assigned the same gas and particulate containment values.

HIGHLIGHT 10-4
SELECTED CONTAINMENT DESCRIPTIONS THAT ARE ASSIGNED THE SAME GAS AND PARTICULATE CONTAINMENT VALUES

GAS/PARTICULATE CONTAINMENT DESCRIPTION	ASSIGNED VALUE IN BOTH HRS TABLES 6-3 AND 6-9
Source substantially surrounded by engineered windbreak and no other containment specifically described in this table applies	7
Uncontaminated soil cover > 3 feet:	
• Source substantially vegetated with little exposed soil	0
• Source lightly vegetated with much exposed soil	3
• Source substantially devoid of vegetation	7
Uncontaminated soil cover $ 1 foot and # 3 feet:	
• Source heavily vegetated with essentially no exposed soil	
— Cover soil type resistant to gas migration	3
— Cover soil type not resistant to gas migration or unknown	7
• Source substantially vegetated with little exposed soil and cover soil type resistant to gas migration	7
• Other	10
Uncontaminated soil cover < 1 foot:	
• Source heavily vegetated with essentially no exposed soil and cover soil type resistant to gas migration	7
• Other	10
Totally or partially enclosed within structurally intact building and no other containment specifically described in HRS Tables 6-3 and 6-9 applies	7

- Several of the descriptions in both tables are only assigned if no other containment description applies (e.g., "source substantially surrounded by engineered windbreak"). Values associated with these descriptions should only be assigned to the source if none of the other descriptions apply.

The key to evaluating most of the containment descriptions in the air pathway is visual observation of the surface characteristics of the source and, in the case of containerized wastes, the condition of the containers. Important physical characteristics to note at each source include:

- The extent of vegetation on the entire source;
- The presence of windbreaks designed to impede air flow over the source;
- The condition of containers (e.g., whether they are intact and sealed); and
- In the case of particulate containment, the presence of liquids that act as a barrier between the particulate and the atmosphere.

Each source should be evaluated as a single entity based on its source type. While several containment types may apply to a given source, only the highest applicable containment value should be assigned (i.e., assign only one containment value for each source). For example, if one portion of a source with greater than 3 feet of uncontaminated cover matches one containment description (e.g., source substantially vegetated with little or no exposed soil) and another portion of the same source

matches another description (e.g., source substantially devoid of vegetation), a separate description that describes the source as a whole should be used instead and the corresponding value should be assigned. In this case, neither 0 (source substantially vegetated with little or no exposed soil) nor 7 (source substantially devoid of vegetation) would be assigned. Instead, the description "source lightly vegetated with much exposed soil" would be used and its corresponding value of 3 would be assigned.

There are two special situations in which the gas containment factor is not based on the type of source containment present. If either of the descriptions “evidence of biogas release” or “active fire within source" applies, then a gas containment value of 10 is assigned to the source. For example, consider a landfill with a 4-foot uncontaminated soil cover that has grass growing-over the entire surface. Based on these characteristics, a gas containment value of 0 would be assigned using the description "uncontaminated soil cover > 3 feet: source substantially vegetated with little exposed soil." However, if evidence of a biogas release from the landfill was available, then a gas containment value of 10 would be assigned. Similarly, if an active fire is present within the landfill, a gas containment value of 10 would be assigned.

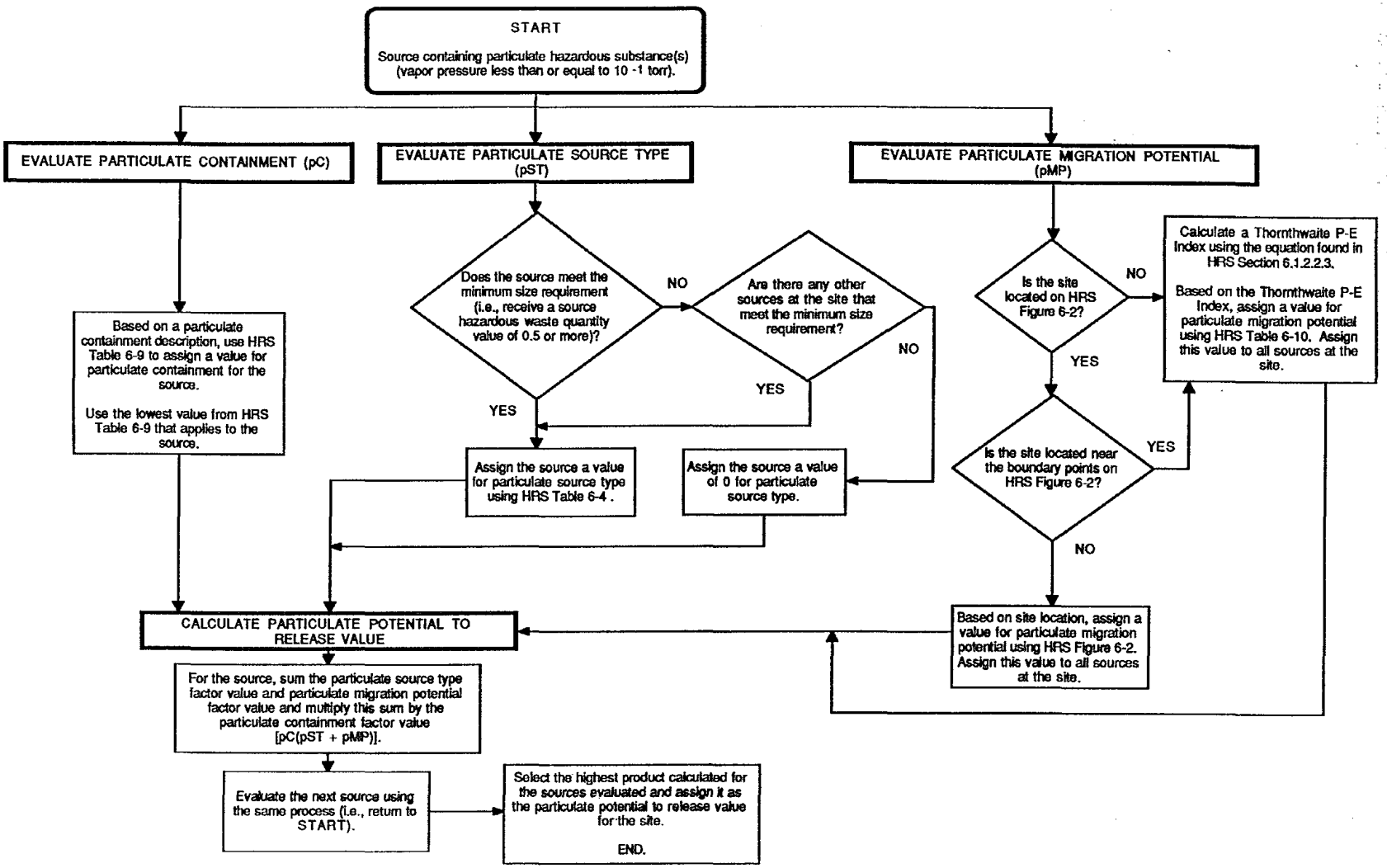
Determining whether evidence of a biogas (e.g., methane) release exists may involve site-specific considerations and require professional judgment. Evidence of biogas release can be based on field measurements collected on or near a source. Several types of field measurements are commonly used to document a biogas release, including:

- Direct reading colorimetric Indicator tube for methane
- Use of an OVA with a methane scrubber
- Use of both an OVA and a photoionization analyzer. If the OVA gets a hit and the photoionization analyzer does not, there is probably a methane release.

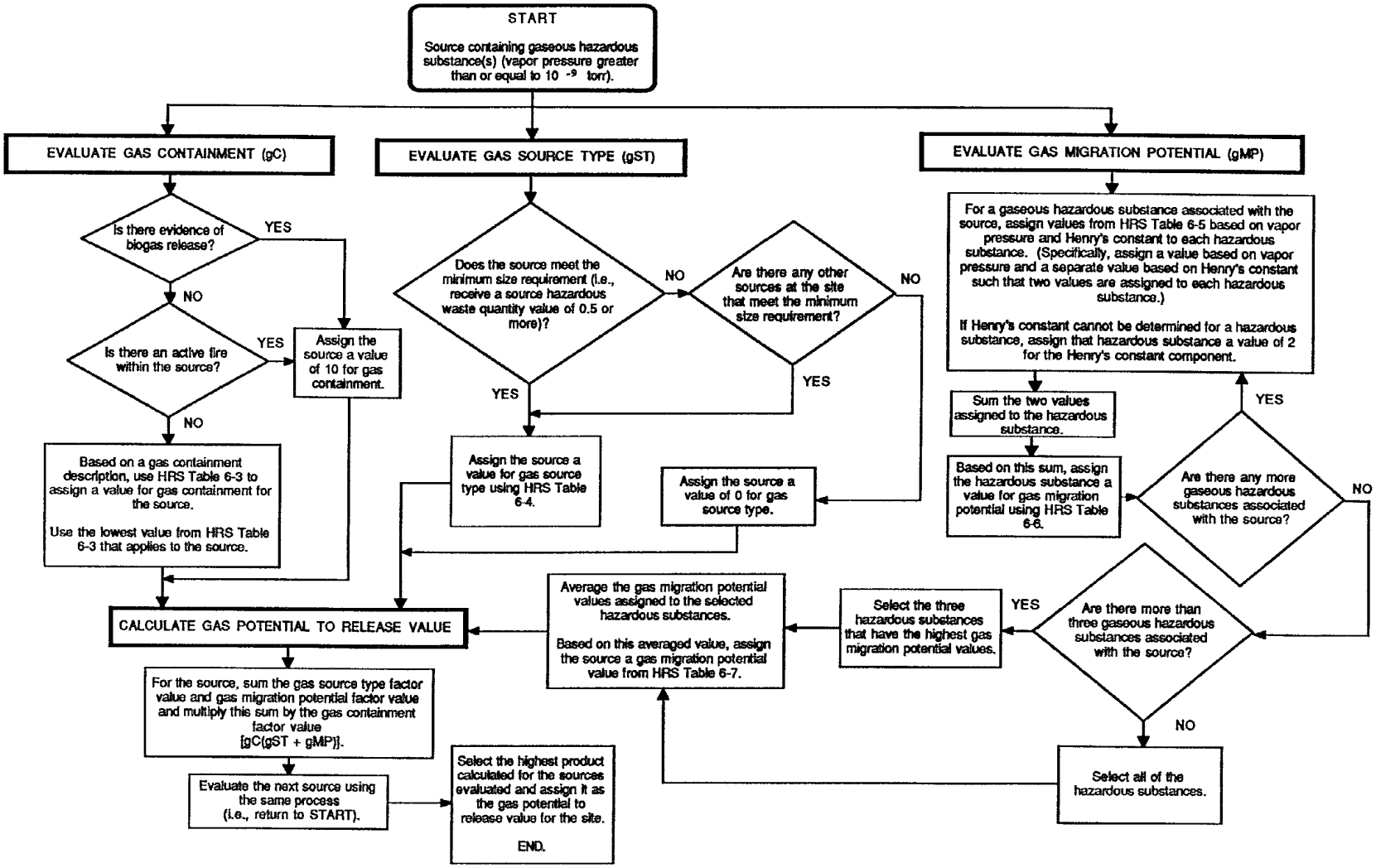
In order to receive the 10-point value for biogas release, the release should be attributable to the site and the supporting documentation should verify that no other potential sources of biogas (e.g., a nearby swamp) are present. Visual observations, such as physical evidence that an explosion due to biogas buildup has occurred, may also be acceptable documentation provided that the explosion occurred because of the presence of biogas and not from the presence of other substances at the site. For purposes of scoring the gas containment factor, the biogas released does not have to be a hazardous substance.

Flowcharts that illustrate the methodology for evaluating the gas potential to release factor and the particulate potential to release factor are presented in ***Highlights 10-5*** and ***10-6***, respectively.

HIGHLIGHT 10-5
FLOWCHART FOR POTENTIAL TO RELEASE: PARTICULATE HAZARDOUS SUBSTANCES



HIGHLIGHT 10-6
FLOWCHART FOR POTENTIAL TO RELEASE: GASEOUS HAZARDOUS SUBSTANCES



SECTION 10.3
ACTUAL CONTAMINATION AND NEAREST INDIVIDUAL

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This section provides guidance on establishing actual contamination in the air pathway. The entire population within a target distance category in the air pathway is evaluated for actual contamination when an observed release is established anywhere within that target distance category. In addition, this section provides guidance on how to evaluate the nearest individual factor.

RELEVANT HRS SECTIONS

Section 2.3	Likelihood of release
Section 2.5	Targets
Section 2.5.1	Determination of level of actual contamination at a sampling location
Section 2.5.2	Comparison to benchmarks
Section 6.3	Targets
Section 6.3.1	Nearest Individual
Section 6.3.2	Population
Section 6.3.2.1	Level of contamination
Section 6.3.2.2	Level I concentrations
Section 6.3.2.3	Level II concentrations

DEFINITIONS

Actual Contamination In the Air Migration Pathway: A target population is subject to actual contamination if a sample location within its distance category meets the criteria for an observed release. Targets located within distance categories closer to the source than the distance category where the observed release is established are also subject to actual contamination.

Level I Concentrations for the Air Migration Pathway: Level I concentrations are established for sampling locations at which the concentration of a hazardous substance that meets the criteria for an observed release is at or above its health-based benchmark. Targets also may be subject to Level I concentrations if multiple hazardous substances that meet the criteria for an observed release are present below their respective benchmarks, and the I or J index is greater than or equal to one. Benchmarks for air include National Ambient Air Quality Standards (NAAQS), National Emission Standard for Hazardous Air Pollutants (NESHAPs), screening concentrations for cancer, and screening concentrations for chronic effects.

Level II Concentrations for the Air Migration Pathway: Level II concentrations are established for sampling locations where the concentration of at least one hazardous substance meets the criteria for an observed release, but the conditions for Level I concentrations are not met. In addition, Level II is assigned for observed releases established by direct observation.

Nearest Individual: Factor evaluated based on the presence of actual contamination or, for potential contamination, the shortest distance from any source at the site to any residence or regularly occupied building or area.

Population for the Air Migration Pathway: Number of residents, students, and workers regularly present within the TDL. This population does not include transient populations, such as hotel and restaurant patrons, but may include seasonal populations (e.g., a resort area).

Students: Full- or part-time attendees of an educational institution or day care facility located within the TDL.

Target Distance Limit for the Air Migration Pathway: Distance over which population and other targets are evaluated. The TDL generally is a 4-mile radius from the sources at the site. However, if a sampling point meeting the criteria for an observed release is located beyond the 4-mile radius, that point defines the outer boundary of the TDL. For example, if an observed release is established 6 miles from the source, the TDL is 6 miles.

Workers: Permanent employees (part-time or full-time) of a facility or business that is located within the TDL.

DETERMINING LEVEL OF ACTUAL CONTAMINATION

In order to evaluate level of actual contamination, an observed release should first be established (see Section 10.1 for establishing observed releases in the air pathway). If an observed release to air is established in or beyond a distance category, actual contamination is also established for that distance category and the level of contamination for the observed release location need to be determined. The steps below explain how to determine if a location is evaluated as Level I or Level II.

(1) **Determine whether an observed release can be established for any hazardous substance detected In air samples or based on direct observation.** See Section 10.1 for information on establishing an observed release.

- If an observed release is established only by direct observation, Level I cannot be established and all locations for the direction observation are Level II. Continue with the guidance in the next subsection, Evaluating Sites with Actual Contamination.
- If an observed release is established based on chemical analysis, continue to Step (2).
- If no observed release can be established, evaluate the entire population within the 4-mile TDL for potential contamination.

(2) **For each sample location, compare the concentration of each hazardous substance that meets the observed release criteria to Its applicable benchmark(s).** When comparing sampling results to benchmarks, concentrations from longer collection times may be compared to shorter time-frame benchmarks, but concentrations from shorter collection times may not be compared to longer time-frame benchmarks. Sample concentrations tend to decrease as sampling time increases (e.g., 8-hour concentrations generally are lower than 3-hour concentrations). Applicable benchmarks (available in SCDM) for hazardous substances include:

- NAAQS;
- NESHAPs;
- Screening concentrations for cancer, which correspond to the 10^{-6} individual cancer risk for inhalation exposure; and

- Screening concentrations for noncancer toxicological responses, which correspond to the RfD for inhalation exposure.

If more than one benchmark applies to a substance, use the benchmark with the lowest concentration. If no benchmark for the air pathway is available for a substance, that substance cannot be used to establish Level I.

- If the concentration of any one or more of the hazardous substances for which an observed release has been established is greater than or equal to its benchmark, score the sample location as Level I. Continue with the guidance in the next subsection.

- If only one hazardous substance meets the observed release criteria and its concentration is less than the lowest applicable benchmark, score the sample location as Level II. Continue with the guidance in the next subsection.

- If more than one hazardous substance meets the observed release criteria and no single substance can be used to establish Level I, continue to Step (3).

(3) **Calculate the I and J indices for all hazardous substances for this sampling location that meet the observed release criteria.** Make two lists of substances that meet the observed release criteria: hazardous substances with screening concentrations for cancer risk, and hazardous substances with screening concentrations for noncancer effects. Each hazardous substance may be on one, neither, or both lists. If more than one sample has been collected at a location and these samples are comparable (e.g., taken in the same time frame, collected using the same field techniques, analyzed by the same methods), for each hazardous substance select the highest concentration to use in the calculations below.

- Calculate the I index for all hazardous substances with screening concentrations for cancer risk that meet the observed release criteria, using the following equation:

$$I = \sum_{i=1}^{n} \frac{C_i}{SC_i}$$

where: C_i = concentration of substance i at the sample location;
SC_i = screening concentration for cancer risk corresponding to a 10^{-6} individual cancer risk for inhalation exposure for hazardous substance i; and
n = number of hazardous substances that meet observed release criteria and for which an SC is available.

- Calculate the J index for all hazardous substances with screening concentrations for noncancer effects that meet the observed release criteria, using the following equation:

$$J = \sum_{j=1}^{m} \frac{C_j}{CR_j}$$

where: C_j = concentration of substance j at the sample location;
CR_j = screening concentration for noncancer effects corresponding to the reference dose for inhalation exposure for hazardous substance j; and
m = number of hazardous substances that meet observed release criteria and for which a CR is available.

- If either the I or J index Is greater than or equal to 1, score the sample location as Level I. If both the I and J indices are less than 1, score the sample location as Level II.

EVALUATING SITES WITH ACTUAL CONTAMINATION

The steps outlined below describe how to evaluate sample locations with actual contamination.

(1) **If only one source is being evaluated, skip to Step (2).** If multiple sources are being evaluated:

- Determine the source to which the observed release is attributable. If this determination cannot be made, select a single source to which the hazardous substance could be attributable (see ***Highlight 10-7***).

- When scoring potential contamination, aggregate identical distance categories that partially or totally overlap (see ***Highlight 10-8***).

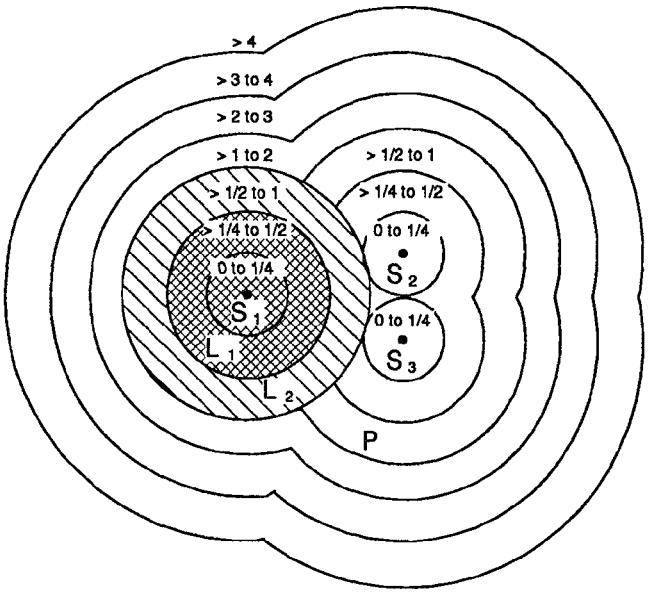
(2) **Determine the most distant sample location (observed release) that meets the criteria for Level I concentrations and the most distant location that meets the criteria for Level II concentrations.** The most distant location meeting the criteria for Level II concentrations can be either a sample location (see ***Highlight 10-9***) or a direct observation location. If the most distant Level II location is closer to the source than the most distant Level I sample location, do not score any distance categories as Level II.

(3) **If a sample location (observed release) meets the criteria for Level I concentrations, determine the distance category Into which that sample location falls.** That distance category and all distance categories closer to the source are scored as Level I concentrations. If the Level I sample location is beyond the 4-mile TDL, no distance categories would be scored as Level II and all populations and sensitive environments between the sample location and the source would be scored at Level I.

(4) **If the most distant observed release meets the criteria for Level II concentrations and is beyond the most distant sample location meeting the criteria for Level I concentrations, Level II concentrations should be scored.** The distance category containing the most distant Level II location and all distance categories between that distance category and the most distant category containing a Level I sampling location should be scored at Level II (see ***Highlight 10-10***). If no distance category contains a Level I sampling location, then the distance category containing the Level II location and all distance categories closer to the source are scored as Level II.

(5) **Score all distance categories not scored as Level I or Level II as potential contamination.** Note that if the most distant Level I or Level II sampling location is beyond the 4-mile TDL, all distance categories should be scored as Level I or Level II; therefore, potential contamination would not be scored.

HIGHLIGHT 10-7
DETERMINING AREAS OF ACTUAL AND POTENTIAL CONTAMINATION WITH MULTIPLE SOURCES



L_1 = Level I sample location

L_2 = Level II sample location

P = Sample location subject to potential contamination

▩ = Scored at Level I

▨ = Scored at Level II

Actual Contamination

(1) Determine the source to which the observed release is attributable.

(2) If this determination cannot be made, select a single source (S_1 in this example) to which the observed release could be attributable.

(3) Draw distance categories around the source selected in Step (1) or (2).

- Targets within the outermost distance category containing a Level I sample location (>1/4 to 1/2 in this example) and targets within all distance categories closer to the source (>0 to 1/4 in this example) are subject to Level I contamination.

- Targets within any distance category containing a Level II location that is beyond the outermost distance category containing a Level I sample location (i.e., >1/2 to 1 in this example) are scored at Level II. If there were distance categories between the one containing the Level II location and the Level I distance category most distant from the source, targets within those distance categories would also be scored at Level II.

(continued on next page)

HIGHLIGHT 10-7 (continued)
DETERMINING AREAS OF ACTUAL AND POTENTIAL CONTAMINATION WITH MULTIPLE SOURCES

Potential Contamination

(1) Targets should be assessed for potential contamination based on the nearest source. To determine the nearest source, draw distance categories around the remaining sources (S_2 and S_3 in this example). All distance categories outside the area of actual contamination (established above) and within the 4-mile TDL are subject to potential contamination.

(2) Aggregate distance categories that are subject to potential contamination for all sources where identical distance categories would overlap.

- For S_2 and S_3, the first distance category to be aggregated is the >1/4 to 1/2.
- The first distance category to be aggregated for all sources is the > 1 to 2.

(3) Score targets subject to potential contamination based upon the distance category into which they fall.

EVALUATING NEAREST INDIVIDUAL FACTOR

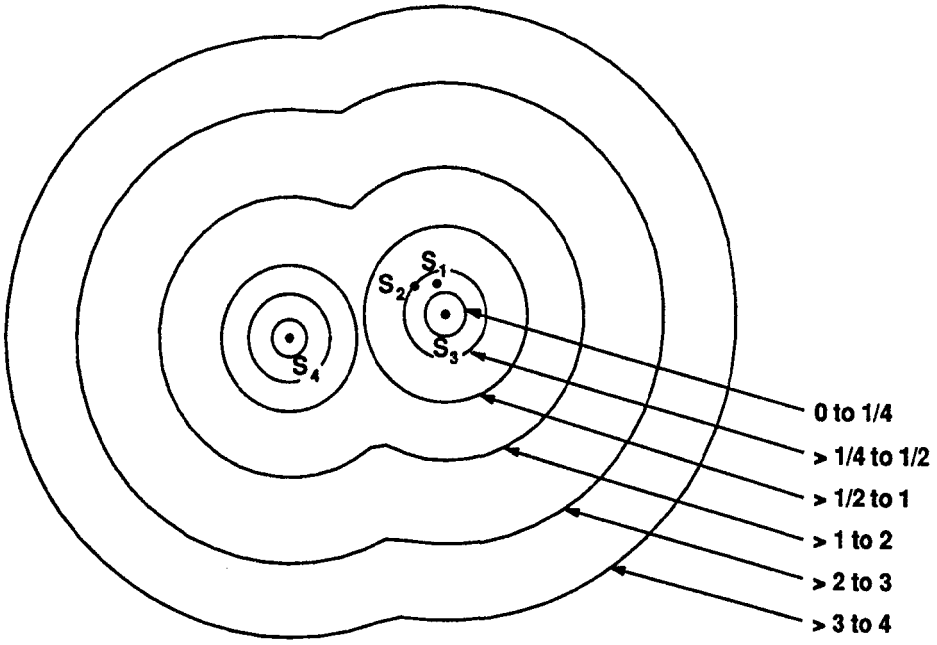
In evaluating the nearest individual factor, consider all residences, regularly occupied buildings, and areas that are within a 1-mile radius of the site.

(1) **Determine whether any residences or regularly occupied buildings or areas are subject to Level I or Level II concentrations.** If not, continue to Step (2). If so, score the nearest individual as follows:

- If one or more residences or regularly occupied buildings or areas is subject to Level I concentrations, assign a factor value of 50.
- If one or more residences or regularly occupied buildings or areas is subject to Level II concentrations, but none is subject to Level I concentrations, assign a factor value of 45.

(2) **Determine the shortest distance to any residence or regularly occupied building or area, as measured from any source at the site with an air migration containment factor value greater than 0.** Based on this shortest distance, use HRS Table 6-16 to assign a value to the nearest individual factor. Note that the distance categories used for evaluating the nearest individual factor differ slightly from the categories used for distance-weighted population values in HRS Table 6-17 (e.g., the 0 and >0 to 1/4 mile category are replaced by the 0 to 1/8 and the >1/8 to 1/4 mile categories).

HIGHLIGHT 10-8
DETERMINING POTENTIAL CONTAMINATION WITH MULTIPLE SOURCES

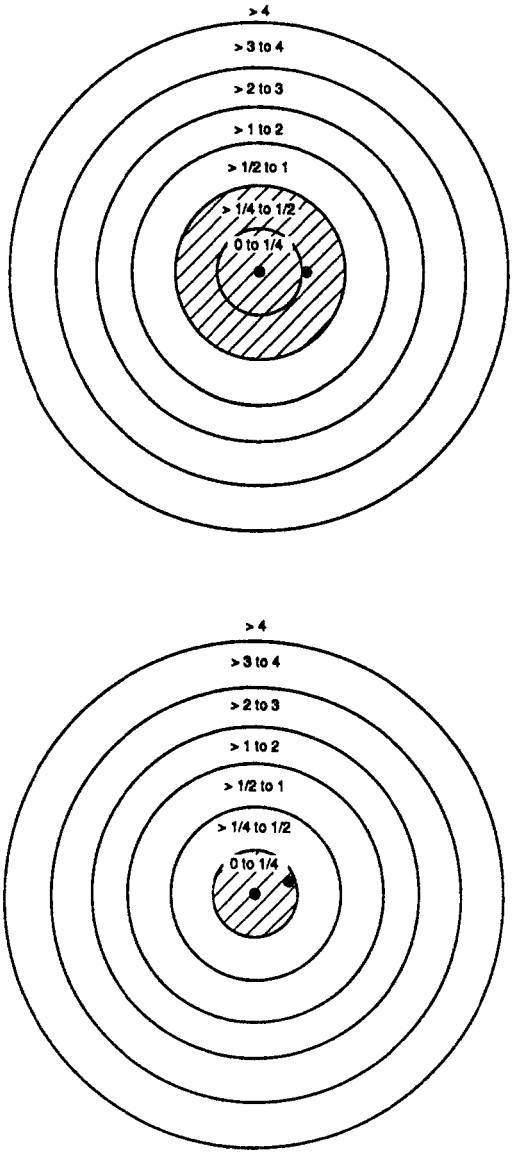


- Draw distance categories around each individual source and then determine aggregate distance categories (i.e., combined categories reflecting overlap of identical distance categories for multiple sources).

- Count each individual only once (however, do not expend extra resources to determine if a resident is also being evaluated as a student or worker) and sum the populations subject to potential contamination for each distance category (e.g., all those individuals located between 1 to 2 miles at each source are added together).

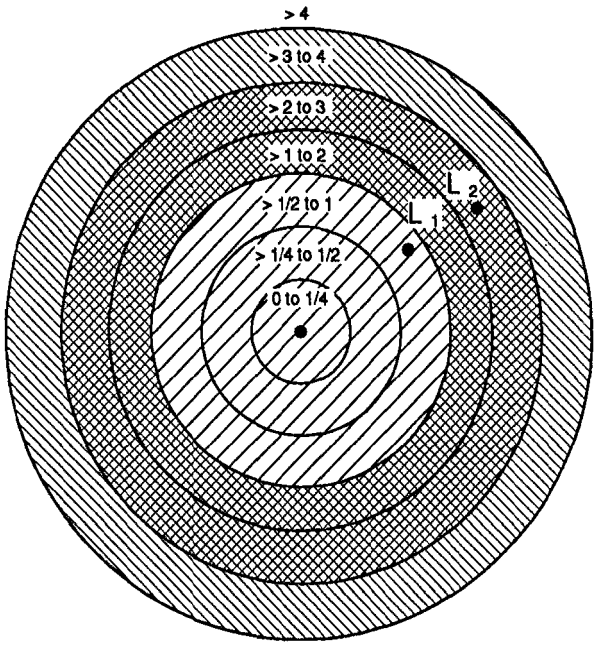
- Determine the nearest individual as the single individual located nearest to any source. Distance categories for assigning a value to the nearest individual factor replace the on-source (0) and >0 to 1/4 category (shown in the diagram) with 0 to 1/8 and >1/8 to 1/4 mile distance categories.

HIGHLIGHT 10-9
EFFECT OF SAMPLE LOCATION ON TARGET POPULATION



These figures indicate that by placing a sampler (or making a direct observation for Level II) just beyond a distance category boundary versus just inside a distance category boundary, a population over a greater area can be evaluated as subject to actual contamination.

HIGHLIGHT 10-10
ILLUSTRATION OF TARGET POPULATIONS SUBJECT TO LEVEL I, LEVEL II, AND POTENTIAL CONTAMINATION



L_1 = Level I sample location

L_2 = Level II sample location

= Level I target population

= Level II target population

= Targets population subject to potential contamination

Distance categories for assigning a value to the nearest individual factor replace the 0 and >0 to 1/4 category (shown in the diagram) with 0 to 1/8 and >1/8 to 1/4 mile distance categories.

TIPS AND REMINDERS

- The basic approach for scoring actual contamination in the air pathway is to set up distance categories around the sources and assign each distance category to Level I, Level II, or potential contamination, depending upon the location of observed releases and the results of comparisons of sample concentrations to benchmarks. Note that an observed release detected just off a source can result in the entire population within the greater than 0-1/4 mile distance category being evaluated as Level I or Level II.

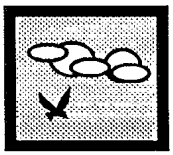
- Any resident, student, or worker located anywhere within the distance category in which the observed release is located is evaluated as subject to actual contamination. In addition, any resident, student, or worker located in distance categories closer to the source is also evaluated as subject to actual contamination.

- The TDL for the air pathway is 4 miles from the edge of a source, unless an observed release is established beyond 4 miles.

- For the nearest individual factor, note that the distance category nearest the source is >0 to 1/8 mile, not >0 to 1/4 mile as it is for the population factor.

- The distance-weighted population value drops sharply farther from the site. Hence, it is most important that the population close to sources be documented carefully.

SECTION 10.4
RESOURCES



T

This section provides guidance for scoring the resources factor in the air pathway. The resources factor evaluates potential damage to recreation areas, commercial agriculture, and commercial silviculture due to site-related atmospheric contaminants. It does not evaluate threats to human health or sensitive environments.

RELEVANT HRS SECTIONS

Section 6.3	Targets
Section 6.3.3	Resources

DEFINITIONS

Commercial Agriculture: Production of crops for sale, including crops intended for widespread distribution (e.g., supermarkets) and more limited distribution (e.g., local produce stands), and any nonfood crops such as cotton and tobacco. Commercial agriculture does not include livestock production, livestock grazing, or crops grown for household consumption (e.g., backyard garden or fruit trees).

Commercial Silviculture: Cultivation of trees for sale (e.g., Christmas tree farm, trees raised for lumber).

Major or Designated Recreation Area: A major recreation area is an area used by a large number of people for recreational purposes (e.g., swimming or baseball). A designated recreation area is an area designated and maintained by a government body (e.g. local, state, Federal) as an area for public recreation.

SCORING THE RESOURCES FACTOR

(1) **Using the checklist In *Highlight 10-11,* determine if there are any commercial agricultural or silvicultural areas, or major or designated recreation areas within 1/2 mile of a source at the site.** Use the above definitions in making this determination. ***Highlight 10-12*** lists examples of data sources for the resources factor.

(2) **If any of these areas are present within 1/2 mile of a source with an air migration containment factor value greater than 0, assign a resource factor value of 5.** If none of these areas is present within 1/2 mile of a source, or if the source has an air migration containment factor of 0, assign a resource factor value of 0.

HIGHTLIGHT 10-11
CHECKLIST FOR RESOURCES FACTOR

For the site being evaluated:

(1)	Is commercial agriculture present within 1/2 mile of a source at the site?	Yes	No
(2)	Is commercial silviculture present within 1/2 mile of a source at the site?	Yes	No
(3)	Is there a major or designated recreation area within 1/2 mile of a source at the site?	Yes	No

If the answer is "yes" for any of the questions above, assign a resources factor value of 5. If the answer is "no" for each question, assign a resources factor value of 0. Remember that the answer is "yes" only if the activity takes place within 1/2 mile of a source with an air migration containment factor value greater than 0.

HIGHLIGHT 10-12
DATA SOURCES FOR THE RESOURCES FACTOR

The following sources of information may help in documenting resource use at the site.

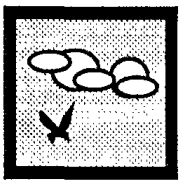
- Agricultural extension agents
- Correspondence with nearby businesses
- Correspondence with other nearby institutions, such as farms or universities
- County land use maps
- Existing PA/SI reports
- Field observations
- Files from adjacent or nearby CERCLIS sites
- Local Chambers of Commerce
- Soil Conservation Service (SCS)
- State departments of natural resources or state environmental departments, especially forestry departments
- The USDA/U.S. Forest Service (USFS)
- Topographic maps

TIPS AND REMINDERS

- Only 5 target points are assigned for the resources factor, regardless of the number of resources present within 1/2 mile of the site. Do not expend significant efforts documenting resource use unless those 5 points may be critical to the site score.

- Resources are only evaluated within 1/2 mile of sources at the site. Resources documented for other pathways may not be close enough to the site to score in the air migration pathway.

SECTION 10.5 EVALUATION OF SENSITIVE ENVIRONMENTS



T

This section provides general guidance for evaluating sensitive environments for the air migration pathway as well as specific guidance and examples for evaluating more complex situations in which multiple sensitive environments overlap. Assigning point values to sensitive environments is straightforward in most cases. In other cases (e.g., when the boundaries of several sensitive environments overlap, or if more than one designation may apply to a single environment), this determination may be less obvious; however, most scoring difficulties can be eliminated by treating each sensitive environment as a separate, independent target. This section addresses only the pathway-specific information necessary to evaluate sensitive environments (including wetlands) in the air pathway. Specific definitions of sensitive environments, sources of information, and steps for identifying sensitive environments are provided in Appendix A.

RELEVANT HRS SECTIONS

Section 6.3	Targets
Section 6.3.4	Sensitive environments
Section 6.3.4.1	Actual contamination
Section 6.3.4.2	Potential contamination
Section 6.3.4.3	Calculation of sensitive environments factor value

DEFINITIONS

Actual Contamination for Listed Sensitive Environments: A listed sensitive environment is considered subject to actual contamination if any portion of the sensitive environment falls within a distance category where an observed release has been established, or in any distance category closer to the site. Direct observation and/or analytical data from air sampling may be used to establish actual contamination.

Sensitive Environment In the Air Pathway: A sensitive environment is a wetland (as defined in 40 CFR 230.3) or any area that meets the criteria listed in HRS Table 4-23. No other areas are considered sensitive environments for the air migration pathway.

CALCULATING THE SENSITIVE ENVIRONMENTS FACTOR VALUE

The following steps describe how to calculate the sensitive environments factor value.

(1) **Identify all sensitive environments listed In HRS Table 4-23 within the TDL.** For each sensitive environment, assign the appropriate point value from HRS Table 4-23. For guidance in identifying sensitive environments, see Appendix A. Use the following guidelines in identifying and assigning point values to each sensitive environment.

- Treat each discrete physical area that can be designated as a sensitive environment as a separate environmental target for HRS scoring purposes, regardless of the degree to which it overlaps with other sensitive environments. For example, critical habitat for an endangered species has the same point value whether located in a state wildlife refuge or not. The state wildlife refuge would be evaluated as a separate sensitive environment (see ***Highlight 10-13***).

- Treat “critical habitat for" or "habitat known to be used by" endangered or threatened species as follows.

  — Identify at least one distinct habitat for each individual species (e.g., if there are three different species, identify three or more habitats, even if they partially or completely overlap).

  — For each individual species, assign only the endangered or threatened category that results in the highest point value. For example, if the same species is both a Federal proposed threatened species (75 points), and a state designated endangered species (50 points), evaluate the species as a Federal proposed threatened species for HRS scoring purposes.

  — If both "critical habitat for” and "habitat known to be used by” the same species occur within the TDL, consider each a separate sensitive environment for HRS scoring purposes. However, if these areas overlap within the TDL, evaluate the overlapping area only as "critical habitat for" the species (i.e., do not consider the zone of overlap as both critical habitat for" and "habitat known to be used by" the species).

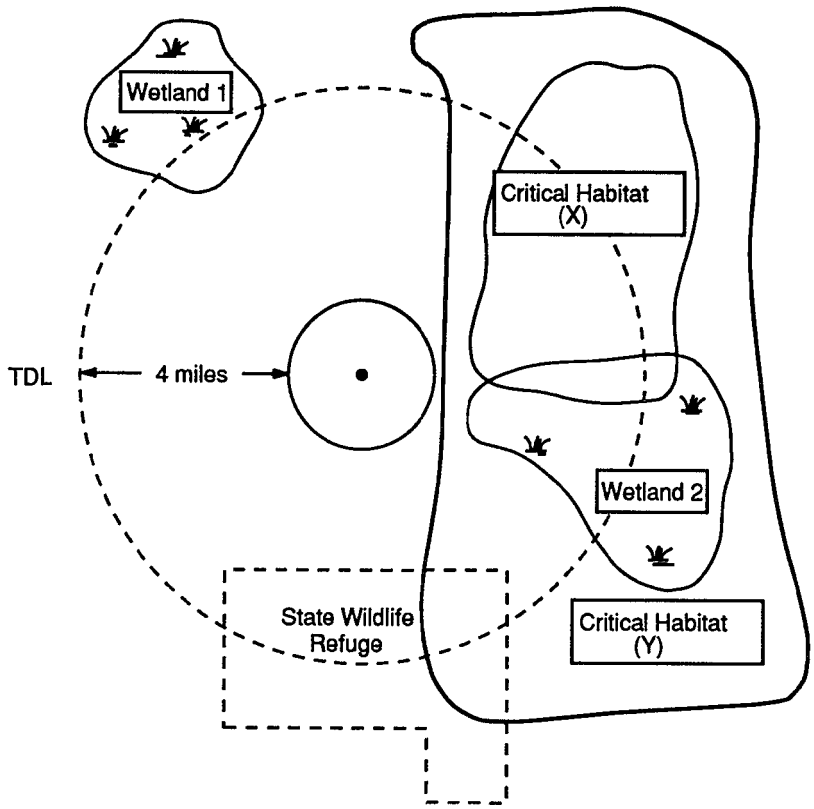
(2) **Based on the most distant location establishing an observed release to air, determine which listed sensitive environments are subject to actual contamination.**

- If multiple sources are present, determine to which source the observed release is attributable. If this determination cannot be made, select a single source to which the hazardous substance could be attributable (see ***Highlight 10-7*** for guidance on drawing distance categories at sites with multiple sources).

- If this location is within the 4-mile TDL, use HRS Table 6-15 to identify the distance category in which the observed release is located. Consider that distance category and all distance categories closer to the source as subject to actual contamination; all other distance categories (i.e., those farther from the source than the distance category in which the observed release is located) should be considered subject to potential contamination. Note that because no appropriate benchmarks exist, no distinction is made between Level I and Level II contamination when scoring sensitive environments in the air migration pathway. Sensitive environments within the TDL are evaluated simply as subject to either actual or potential contamination (i.e., actual contamination is not divided into Level I and Level II).

- If this location is beyond the 4-mile TDL, draw the boundary of a distance category extending to that location. Any sensitive environments located partially or entirely within that distance category or a distance category closer to the source are considered subject to actual contamination. In such a case, no sensitive environments are considered subject to potential contamination (see ***Highlights 10-14*** and ***10-15).***

HIGHLIGHT 10-13
IDENTIFYING SENSITIVE ENVIRONMENTS IN THE AIR PATHWAY



The above figure is a schematic map (not to scale) of the 4-mile TDL associated with a hypothetical site. From background documents and discussions with appropriate Federal and state agencies, the following information is available:

The area labelled Critical Habitat (Y) is a critical habitat for Federal endangered species. The area labelled Critical Habitat (X) is a critical habitat for a different Federal endangered species. The outlined area at the bottom of the map, directly beneath the source, is a state wildlife refuge. The areas designated as Wetland 1 and Wetland 2 are wetlands as defined in 40 CFR 230.3.

Based on this information, and by referring to HRS Tables 4-23 and 6-18 of the HRS Rule, the following sensitive environments are identified:

(1) The area labelled Critical Habitat (Y) is identified as a critical habitat for Federal endangered species (Y) and assigned a value of 100 points;

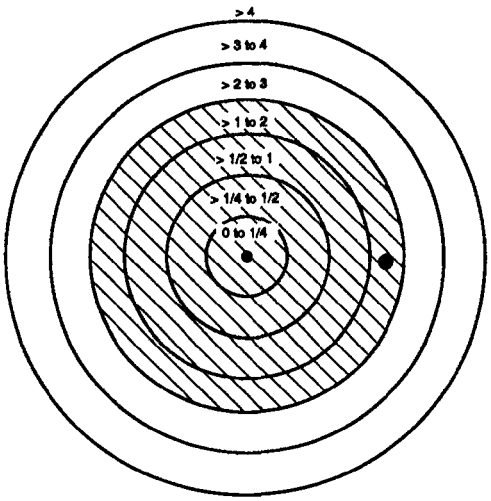
(2) The area labelled Critical Habitat (X) is identified as a critical habitat for Federal endangered species (X) and assigned a value of 100 points;

(3) The state wildlife refuge is assigned a value of 75 points;

(4) The area designated as Wetland 1 and the area designated as Wetland 2 are assigned a point value based on total acreage within the TDL (see ***Highlight 10-15***).

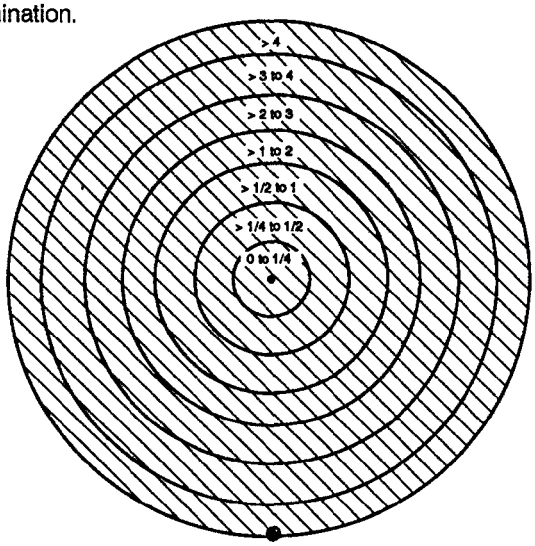
HIGHLIGHT 10-14
DETERMINING ACTUAL AND POTENTIAL CONTAMINATION FOR SENSITIVE ENVIRONMENTS

If an observed release location falls within a distance category less than 4 miles from the nearest edge of the source, the distance category that contains the observed release and all distance categories that are closer to the site are considered subject to actual contamination.



▨ = Actual contamination
● = Observed release

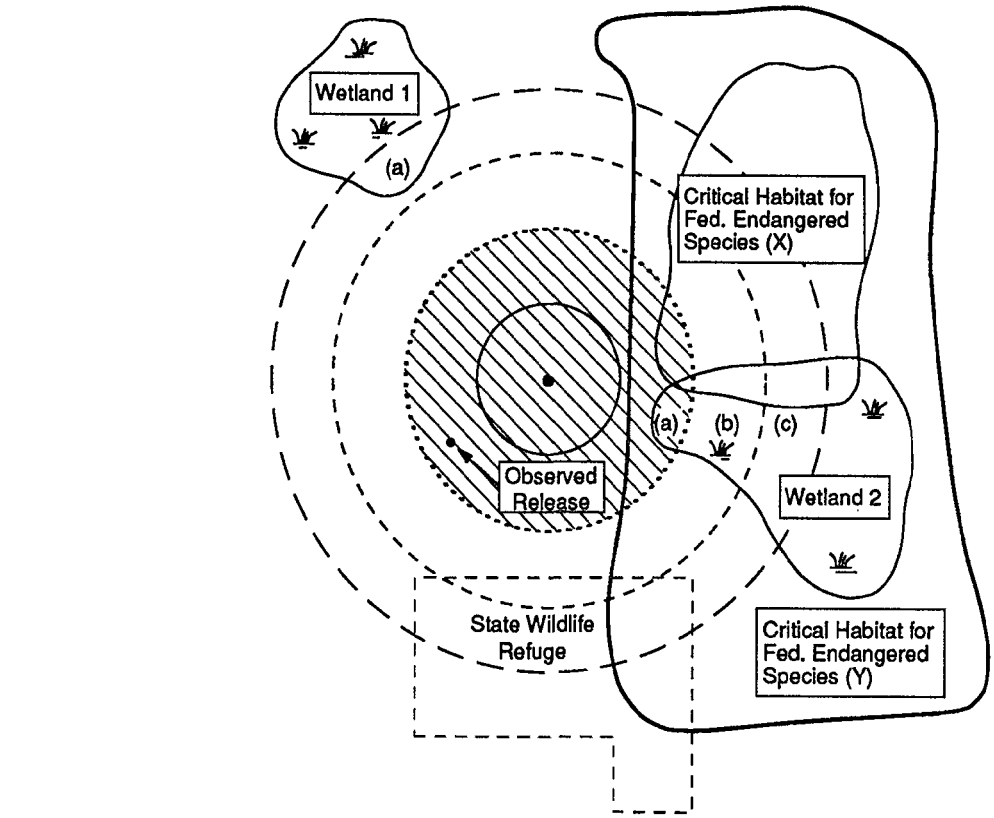
If an observed release location is more than 4 miles from the nearest edge of the source, the entire area between the source and a distance ring established by the radii extending to the location of the observed release is considered subject to actual contamination. In such cases, no distance categories are considered subject to potential contamination.



▨ = Actual contamination
⊕ = Observed release

For sensitive environments in the air pathway, there are no established benchmarks and, therefore, there is no distinction between areas of Level I and Level II contamination.

HIGHLIGHT 10-15
SCORING EXAMPLE FOR SENSITIVE ENVIRONMENTS



At this site, the area of actual contamination has been determined, the assigned value for likelihood of release (LR) is 550, and the assigned value for waste characteristics (WC) is 56. Five sensitive environments were identified and delineated as shown. Portion (a) of Wetland 1 (i.e., portion within >3 to 4 miles of the source) was determined to be 43 acres. Portions (a), (b), and (c) of Wetland 2 were determined to be 13 acres, 34 acres, and 60 acres, respectively. The sensitive environments factor value was obtained using the steps outlined below.

(continued on next page)

HIGHLIGHT 10-15 (continued)
SCORING EXAMPLE FOR SENSITIVE ENVIRONMENTS

(1) Critical habitats (X) and (Y) are considered subject to actual contamination because they are each partially within the area of actual contamination (identified with diagonal lines). The combined value for these two environments is 200. Portion (a) of Wetland 2 is subject to actual contamination and is assigned a wetland rating value of 25. These two values are added (200 + 25 = 225) to calculate the actual contamination value.

(2) The state wildlife refuge, portion (a) of wetland 1, and portions (b) and (c) of wetland 2 are outside the area of actual contamination, but within the TDL, and therefore, are considered subject to potential contamination. The state wildlife refuge, at a distance of >2 to 3 miles, is assigned a value of 75 and a distance weight of 0.0023. Portion (b) of Wetland 2 is also assigned a distance weight of 0.0023 and a wetlands rating value of 25. The 43 acres in Portion (a) of Wetland 1 and the 60 acres in Portion (c) of Wetland 2 are summed (43 + 60 = 103 acres), and this total acreage is assigned a wetlands rating value of 125. Portion (a) of Wetland 1 and Portion (c) of Wetland 2 are also assigned a distance weight of 0.0014 because they are within the >3 to 4-mile distance category. The sensitive environment rating values for each distance category are summed and then multiplied by the distance weight for that distance category. All of these values are summed, such that [(0.0023)(75 + 25) + (0.0014) (125) = 0.41]. This value divided by 10 (i.e., 0.041) is the potential contamination value. This figure is not rounded because it is less than one.

(3) The total targets value for sensitive environments (EB) was determined by summing the actual contamination value and the potential contamination value [225 + 0.041 = 225.041].

(4) The sensitive environments factor value was determined as follows:

- The values for LR, WC, and EB were multiplied together and then divided by 82,500 to obtain the score (S) of 84.015.
- Because 84.015 is greater than 60, it was necessary to calculate the value EC = 160.71, which was obtained by dividing 4,950,000 by (LR x WC).
- The sensitive environments factor was assigned a value of 160.71 (i.e., EC).

— Note that if any portion of a sensitive environment listed in HRS Table 4-23 is subject to actual contamination, the entire sensitive environment is scored as subject to actual contamination.

- Sum all of the sensitive environments values (from HRS Table 4-23) for sensitive environments subject to actual contamination. Do <u>not</u> distance weight these values. Assign this total as the actual contamination value for listed sensitive environments not being evaluated solely as wetlands.

(3) **Determine which listed sensitive environments are subject to potential contamination.**

- If the distance category containing the most distant observed release to air is closer than the 4-mile TDL, any listed sensitive environments entirely beyond that distance category, but at least partially within the TDL, are considered subject to potential contamination. Note that if a sensitive environment is subject to actual contamination, it cannot also be considered subject to potential contamination. If no observed release to air is established, all sensitive environments at least partially within the 4- mile TDL would be considered subject to potential contamination.

- Determine the distance category that each listed sensitive environment subject to potential contamination falls within. If a listed sensitive environment falls into more than one distance category, assign only the highest applicable distance weight (i.e., count it only once and use the closest distance category).

- Sum the assigned values for all of the listed sensitive environments that fall within a single distance category and multiply that total by the appropriate distance weight. Remember to count each listed sensitive environment only once in the closest distance category. Sum all of these distance weighted values and assign this total as the potential contamination value for listed sensitive environments not being evaluated solely as wetlands.

- When scoring potential contamination, aggregate identical distance categories that partially or totally overlap (see ***Highlight 10-8*** for guidance on drawing distance categories at sites with multiple sources).

(4) **If wetlands are present within the TDL, determine which portions of the wetlands are subject to actual contamination and which portions are subject to potential contamination.**

- Only the portion of each discrete wetland area that is within the distance category established by the most distant observed release location (or a distance category closer to the sources) should be considered subject to actual contamination.

- Wetlands or portions of wetlands farther from the source than the distance category containing the most distant observed release location, but within the 4-mile TDL, should be considered subject to potential contamination.

(5) **Determine the total acreage of wetlands subject to actual contamination and the total acreage of wetlands subject to potential contamination.** There are a number of relatively simple quantitative methods for estimating the acreage of a given area. These include:

- Using a digitizing tablet;

- Using graph paper as an overlay for a map with an accurate scale (e.g., a USGS topographic map); or

- Cutting out a standard (e.g., a 10-acre square of the map) and comparing the mass of the standard against the mass of the clippings from the portion of the map for which the acreage is to be determined. This can be done using a standard laboratory balance scale.

(6) **Assign the appropriate wetland rating value using HRS Table 6-18 based on the total acreage of wetlands subject to actual contamination.** Assign this value as the actual contamination value for wetlands.

(7) **Identify the distance categories (listed in HRS Table 6-15) that include portions of wetlands subject to potential contamination.** Based on total acreage of all wetlands within a particular distance category, assign the appropriate wetland rating value for the portions of wetlands subject to potential contamination. For example, if 10 acres of a 100-acre wetland are within a particular distance category, only those 10 acres should be evaluated for that particular distance category.

- Sum the total acreage of wetlands or portions of wetlands present within a single distance category.

- Assign a single wetlands rating value to that distance category based on the total acreage of all wetlands within that distance category.

- Multiply the sum of the wetlands rating values for a single distance category by the distance weight for that distance category. Distance weights are provided in HRS Table 6-15.

Repeat the above procedure for each distance category subject to potential contamination (i.e., those within the TDL not subject to actual contamination).

Sum the potential contamination values calculated for each distance category and assign this value as the potential contamination value for wetlands.

(8) **Calculate the actual contamination factor value and the potential contamination factor values.**

- Sum the assigned actual contamination values for listed sensitive environments and for wetlands. Assign this value as the actual contamination factor value.

- Sum the assigned potential contamination values for listed sensitive environments and for wetlands. Divide that value by ten. If this value is less than 1, do not round it to the nearest integer. If this value is greater than 1, round it to the nearest integer. Assign this value as the potential contamination factor value.

(9) **Calculate the total value for sensitive environments.** Sum the factor values for actual contamination and potential contamination. Assign this value as the sensitive environments total value (EB).

(10) **Calculate the sensitive environments factor value.** Because the air migration pathway score based solely on sensitive environments is limited to 60 points, the method for determining the sensitive environments factor value depends on the total value for sensitive environments (EB, as calculated in Step (9) above), the likelihood of release value for the air pathway (LR), and the waste characteristics value (WC).

- Multiply the values assigned to LR, WC, and EB for the site and divide this product by 82,500.

- If the resulting score (S) is 60 or less, assign EB as the sensitive environments factor value.

- If the resulting score (S) is greater than 60, assign only that portion of EB that will result in a score of 60 as the sensitive environments factor value. This value, termed EC, is calculated as follows:

$$EC = \frac{(60)(82{,}500)}{(LR)(WC)} = \frac{4{,}950{,}000}{(LR)(WC)}$$

Note: Do not round EC to the nearest integer.

TIPS AND REMINDERS

- Only wetlands (as defined in 40 CFR 230.3) and areas that are listed in HRS Table 4-23 are considered sensitive environments in the air pathway.
- Treat each discrete sensitive environment as a separate, independent target for assigning point values and determining level of contamination, regardless of the degree to which its boundaries overlap with those of other sensitive environments.
- Identify at least one separate sensitive environment for each endangered or threatened species, but assign only one category (e.g., Federal endangered or state threatened, but not both) to each species.
- Designations of threatened or endangered species listed at the state level are valid only within the borders of that state.
- Wetland areas can be evaluated both as a wetland and as other types of sensitive environments (e.g., critical habitat).
- If any portion of a listed sensitive environment is subject to actual contamination, the entire sensitive environment is considered subject to actual contamination. Note that this is not true for wetlands.
- Wetland acreage estimates must be based on the portion of each wetland area within each distance category (e.g., only the portion of a wetland within a distance category subject to actual contamination is evaluated under actual contamination).
- In evaluating wetlands for potential contamination, evaluate all wetlands in a single distance category as a distinct sensitive environment.
- There is no limit to the air pathway targets factor category score; however, the air pathway score based solely on sensitive environments is subject to a maximum of 60 points.